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ADAPTATION, YIELD AND QUALITY OF ANNUAL FORAGE CROP CULTIVARS IN SASKATCHEWAN

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Final Report
Project 20020019 – Adaptation, yield and quality of annual forage crop cultivars in Saskatchewan
December 28, 2005

a. Abstract/Summary: Varieties of barley (23) and oats (14) provided by seed companies and the Crop Development Centre were seeded in forage evaluation trials in 2003, 2004 and 2005 at several locations in Saskatchewan. Variety yield rankings varied from one site to another, especially for oats. Consistently high yielding barley varieties were identified.

b. Executive Summary: The objective of this project was to test many of the available and experimental barley and oat varieties for forage yield and make recommendations to producers in Saskatchewan. Varieties of barley (23) and oats (14) provided by seed companies and the Crop Development Centre were seeded in forage evaluation trials in 2003, 2004 and 2005 at several locations in Saskatchewan. For barley, the experimental line SB 97590R was consistently a high yielder in the two years in which it was entered in trials. The 2003 data supported its registration as CDC Cowboy. Newdale was also consistently near the top in yield in most trials and had the highest mean yield of the three varieties which were entered in all trials over the three years. For oats, there was more variation in ranking, so no clearly superior or inferior varieties were identified. For the four varieties in all trials over the three years, Triple Crown had the highest mean yield, while Foothill had the lowest. Summaries of these yield trials were sent to the companies/institutions that submitted them for testing. A full set of data from these trials will be included in the Saskatchewan Forage Crop Production Guide as appropriate.

Technical Report:

Objectives: 1) to evaluate widely grown and recently released barley and oat varieties for forage yield and quality for use in the Saskatchewan livestock industry; 2) to evaluate advanced CDC (and other program) barley and oat selections for forage yield and quality; and 3) to provide SAF extension agrologists with sites for demonstrating annual forage varietal performance to local livestock/forage producer groups within Saskatchewan.

Experimental protocol: Varieties of barley and oats provided by seed companies and the Crop Development Centre were seeded in forage evaluation trials in 2003, 2004 and 2005 (Table A). Trials were managed by Mr. Randy Pastl of the Sask. Forage Council in 2003. Following his departure, Dr. Bruce Coulman and Mr. Tim Nelson of AAFC, Saskatoon Research Centre coordinated the trials. Six sites were seeded in 2003 and four in 2004 and 2005. In 2003, not all lines were seeded at all sites. A total of 14 different oat and 23 different barley lines were tested in this project. Over the three years of testing, three barley and four oat lines were present in all trials.

Submitted lines were seeded in four replicate randomized complete block trials at recommended rates. Plots were fertilized (kg/ha) according to soil tests with 11 N and 55 P_2O_5 at Saskatoon (fallow) in all three years. In 2003 and 2004 on stubble at Scott, 5 N and 26 P_2O_5 were seed placed, and 40 N banded, while in 2005, 11 N and 22 P_2O_5 were seed placed on chem fallow. At Melfort, seeding was done on fallow on a rich black soil, so no fertilizer was applied in any of the three years. Trials were harvested with an experimental harvester (Hege, Haldrup or Swift) equipped with an automatic weighing system. Sub-samples were collected and dried at 60° C to determine dry matter percentage to calculate dry matter yields. Trials were harvested when the majority of the oats had reached the soft-dough stage and the barley had reached mid-dough.

Results: Temperature and precipitation data are reported in Appendix A. For all sites in the study, the growing season of 2003 was drier than normal and had higher temperatures. In 2004 and 2005, temperatures were lower and precipitation higher than the long term normals. This explains why the lowest yields were obtained for both barley and oats in 2003 (Tables 19 and 20).

Not all oat and barley lines were seeded at all sites in 2003. The 2003 results for individual locations are presented in Tables 1-12. The combined results for 2003, showing only those varieties found at all sites, are presented in Table 13 and 14 for oats and barley, respectively. In 2003, the ranking of oat lines by yield was highly variable among locations (Table 1, 3, 5, 7, 9, 11). AC Murphy was consistently higher yielding than the established check varieties Calibre and CDC Baler, while Pinnacle and CDC Bell usually outyielded the checks. There was also variation in barley line ranking from trial to trial in 2003 (Tables 2, 4, 6, 8, 10 and 12), but the experimental line SB 97590R was the top yielder in the five trials in which it was entered. This experimental line has since been registered as CDC Cowboy. For the lines that were present in all six trials in 2003 (Tables 13 and 14), AC Ranger was the highest yielding barley, with Robust being clearly the poorest. The oat lines AC Murphy and Foothill had the highest yields in 2003 and AC Assiniboia the lowest.

In 2004, the oat lines Pinnacle, CDC Baler, CDC Orrin and Triple Crown produced similar mean yields (Table 15). Rankings of yield performance of these four lines varied from site to site but yields were not significantly different from one another ($p<0.05$) within any of the sites. The other line in the trial, Foothill had the lowest mean yield and was the lowest yielding at all four sites. The results of the barley trial in 2004 (Table 16), show that Newdale had the highest mean yield, mainly due to high yields produced at Melfort and Saskatoon. Haybet was the lowest mean yielder; however it produced high yields at Swift Current.

Yield results for the 2005 oat trials (Table 17) show ranking between lines similar to that observed in 2004. In 2005, Triple Crown had the highest mean yield, while Foothill again was ranked at the bottom of the list. In 2005, the barley (Table 18) line rankings were consistent with those of previous years. Newdale again had the highest mean yields followed by CDC Cowboy. Both these lines were consistently at or near the top of the ranking at all four sites. Haybet was again among the lowest yielding lines.

The mean yields over the three years for those oat varieties that were in all trials (Table 19) ranged from 7532 to 8046 kg/ha with Foothill, the lowest, being significantly different from Triple Crown, the highest yielding line. For barley (Table 20), Newdale and AC Ranger showed a considerable and significant yield advantage over Haybet.

Discussions and Conclusions: Ideally, to make valid comparisons among all varieties, they all should have been included in all trials over the three years. Despite variability in ranking of varieties from one site to another, particularly in 2003, some specific and useful trends were identified.

For barley, the experimental line SB 97590R was consistently a high yielder in the two years (2003 and 2005) in which it was entered in trials. The 2003 data supported its registration as CDC Cowboy. Newdale barley was also consistently near the top in yield in most trials and had the highest mean yield of the three varieties which were entered in all trials over the three years. Haybet was a low yielding variety in almost all trials and had the lowest mean yield over three years.

For oats, there was more variation in ranking, so no clearly superior or inferior varieties were identifed. Among the four varieties in all trials over the three years, Triple Crown had the highest mean yield, while Foothill was the lowest.

Summaries of these yield trials were sent to the companies/institutions that submitted them for testing. A full set of data from these trials will be sent to SAFRR forage specialist Michel Tremblay for inclusion in the Saskatchewan Forage Crop Production Guide as appropriate.

Deviation from project proposal: No samples were analyzed for forage quality (ADF, NDF, CP)

d. Personnel: A summer student was hired at each location in each year.

e. Equipment: None purchased

f. Project Developed Materials: None

g. Project Photos: None

h. Acknowledgement: No presentations or publications were made; however the contribution of ADF was indicated to seed companies when seed was requested

i. Expense Statement: Attached

j. ICAR Data Entry: Not entered

Table A. Location and year of trials seeded in the project.

Species	Year	Location	Number of entries
Oat	2003	Seager Wheeler	11
Oat	2003	Canora	13
Oat	2003	Saskatoon (Kernen)	13
Oat	2003	Melfort	13
Oat	2003	Scott	13
Oat	2003	Netherhill	13
Oat	2004	Melfort	5
Oat	2004	Swift Current	5
Oat	2004	Scott	5
Oat	2004	Saskatoon (Kernen)	5
Oat	2005	Melfort	6
Oat	2005	Swift Current	6
Oat	2005	Scott	6
Oat	2005	Saskatoon (Kernen)	6
Barley	2003	Seager Wheeler	13
Barley	2003	Canora	15
Barley	2003	Saskatoon (Kernen)	15
Barley	2003	Melfort	14
Barley	2003	Scott	15
Barley	2003	Netherhill	14
Barley	2004	Melfort	8
Barley	2004	Swift Current	8
Barley	2004	Scott	8
Barley	2004	Saskatoon (Kernen)	8
Barley	2005	Melfort	10
Barley	2005	Swift Current	10
Barley	2005	Scott	10
Barley	2005	Saskatoon (Kernen)	10

Table 1. Oat Trials

Test of Forage Green Feed Yields

Seager Wheeler Farm, Rosthern, Sask.

Sown May 2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 14/2003	% of Calibre
Triple Crown	8701	106
Pinnacle	8524	104
AC Murphy	8334	102
AC Mustang	8290	101
CDC Orrin	8250	101
Calibre	**8180**	**100**
Foothill	8136	99
Derby	7760	95
AC Assiniboia	7637	93
Spelt	7627	93
AC Morgan	7547	92
MEAN	8090	
C.V. (%)	13	
LSD(0.05)	1469 (ns)	

Table 2. Barley Trials

Test of Forage Green Feed Yields

Seager Wheeler Farm, Rosthern, Sask.

Sown May 2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 14/2003	% of AC Rosser
CDC Bold	8890	107
Westford	8811	106
Newdale	8415	101
AC Rosser	**8340**	**100**
Niska	8297	99
AC Ranger	8230	99
AC Hawkeye	8178	98
CDC Battleford	8069	97
Dillon	7735	93
Haybet	7720	93
CDC Sisler	7689	92
Sommerville	6994	84
Robust	6235	75
MEAN	7969	
C.V. (%)	10	
LSD(0.05)	1160	

Table 3. OatTrials
Test of Forage Green Feed Yields
Canora, Sask.
Sown May
2003

Variety	2003	
	Total Forage Yield (kg DM/ha) July 31/2003	% of CDC Baler
AC Murphy	12693	107
CDC Bell	12586	106
Foothill	11927	101
CDC Baler	**11829**	**100**
Derby	11084	94
Triple Crown	10812	91
Calibre	10771	91
Spelt	10404	88
AC Mustang	10289	87
CDC Orrin	9802	83
AC Assiniboia	9800	83
AC Morgan	9724	82
Pinnacle	9463	80
MEAN	10860	
C.V. (%)	7	
LSD(0.05)	1159	

Table 4. Barley Trials
Test of Forage Green Feed Yields
Canora, Sask.
Sown May
2003

Variety	2003	
	Total Forage Yield (kg DM/ha) July 31/2003	% of AC Rosser
SB 97590 R	13459	113
AC Ranger	13398	112
Westford	12852	107
CDC Sisler	12604	105
Newdale	12224	102
AC Rosser	**11961**	**100**
SH 97088 SM	11615	97
Niska	11479	96
Dillon	11401	95
Robust	11093	93
Sommerville	10993	92
CDC Bold	10774	90
Haybet	10355	87
AC Hawkeye	9747	81
CDC Battleford	9429	79
MEAN	11559	
C.V. (%)	22	
LSD(0.05)	3575	

Table 5. OatTrials
Test of Forage Green Feed Yields
Saskatoon, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 11/2003	2003 % of CDC Baler
AC Murphy	5219	112
Derby	5051	108
Calibre	5043	108
Foothill	5009	107
Spelt	4929	106
CDC Bell	4746	102
AC Mustang	4665	100
CDC Baler	**4662**	**100**
CDC Orrin	4642	100
AC Morgan	4518	97
Pinnacle	4436	95
Triple Crown	4276	92
AC Assiniboia	4086	88
MEAN	4714	
C.V. (%)	6	
LSD(0.05)	408	

Table 6. Barley Trials
Test of Forage Green Feed Yields
Saskatoon, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) July 29/2003	2003 % of AC Rosser
SB 97590 R	6063	115
CDC Bold	5316	101
Newdale	5304	100
AC Rosser	**5286**	**100**
AC Ranger	5193	98
Sommerville	5183	98
Haybet	5098	96
CDC Battleford	5078	96
CDC Sisler	4951	94
Dillon	4933	93
Niska	4926	93
Westford	4911	93
SH 97088 SM	4901	93
AC Hawkeye	4812	91
Robust	4364	83
MEAN	5088	
C.V. (%)	6	
LSD(0.05)	422	

Table 7. OatTrials
Test of Forage Green Feed Yields
Melfort, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 1/2003	2003 % of CDC Baler
Foothill	9068	112
Murphy	9029	111
CDC Bell	8718	107
Triple Crown	8562	105
Pinnacle	8407	103
Calibre	8330	102
CDC Orrin	8131	100
CDC Baler	**8130**	**100**
AC Mustang	8028	99
AC Assiniboia	7913	97
Spelt	7881	97
Derby	7878	97
AC Morgan	7858	97
MEAN	8302	
C.V. (%)	10	
LSD(0.05)	1164 (ns)	

Table 8. Barley Trials
Test of Forage Green Feed Yields
Melfort, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 1/2003	2003 % of AC Rosser
SB 97590 R	9642	106
AC Rosser	**9086**	**100**
CDC Bold	8969	99
AC Ranger	8954	99
CDC Sisler	8856	98
CDC Battleford	8780	97
AC Hawkeye	8737	96
Newdale	8555	94
Niska	8453	93
SH 97088 SM	8328	92
Haybet	7847	87
Dillon	7816	86
Westford	7760	86
Robust	7193	79
MEAN	8497	
C.V. (%)	10	
LSD(0.05)	1196	

Table 9. OatTrials
Test of Forage Green Feed Yields
Scott, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 13/2003	% of CDC Baler
Derby	5428	104
Murphy	5426	104
CDC Orrin	5346	103
Foothill	5341	103
Triple Crown	5327	102
Calibre	5263	101
Pinnacle	5238	101
CDC Baler	**5201**	**100**
CDC Bell	5175	99
AC Morgan	5064	97
AC Mustang	5002	96
AC Assiniboia	4803	92
Spelt	3749	72
MEAN	5105	
C.V. (%)	8	
LSD(0.05)	617	

Table 10. Barley Trials
Test of Forage Green Feed Yields
Scott, Sask.
Sown May
2003

Variety	2003 Total Forage Yield (kg DM/ha) Aug. 13/2003	% of AC Rosser
SB 97590 R	5117	110
AC Rosser	**4645**	**100**
Newdale	4645	100
CDC Sisler	4478	96
Haybet	4411	95
CDC Bold	4395	95
AC Ranger	4354	94
SH 97088 SM	4222	91
CDC Battleford	4181	90
Westford	4157	89
Dillon	4097	88
Sommerville	4026	87
AC Hawkeye	4019	87
Niska	3886	84
Robust	3867	83
MEAN	4300	
C.V. (%)	16	
LSD(0.05)	973	

Table 11. OatTrials
Test of Forage Green Feed Yields
Netherhill, Sask.
Sown May
2003

Variety	2003	
	Total Forage Yield (kg DM/ha) Aug 12/2003	% of CDC Baler
Pinnacle	5551	134
CDC Orrin	5189	125
Foothill	5082	123
Spelt	4893	118
Calibre	4725	114
Derby	4679	113
AC Mustang	4670	113
Murphy	4624	112
AC Assiniboia	4518	109
CDC Bell	4505	109
AC Morgan	4449	108
Triple Crown	4365	105
CDC Baler	**4138**	**100**
MEAN	4722	
C.V. (%)	9	
LSD(0.05)	623	

Table 12. Barley Trials
Test of Forage Green Feed Yields
Netherhill, Sask.
Sown May
2003

Variety	2003	
	Total Forage Yield (kg DM/ha) Aug 12/2003	% of AC Rosser
SB 97590 R	5615	112
Dillon	5518	110
CDC Bold	5433	108
CDC Sisler	5207	103
AC Hawkeye	5147	102
CDC Battleford	5119	102
Westford	5095	101
AC Rosser	**5033**	**100**
SH 97088 SM	4951	98
AC Ranger	4911	98
Newdale	4910	98
Haybet	4866	97
Robust	4513	90
Niska	4337	86
MEAN	5047	
C.V. (%)	7	
LSD(0.05)	536	

Table 13. 2003 SFC Annual Oat Forage Production Trial
Summary of six sites for varieties present at all sites

	2003 DM Yields (kg/ha)						
VARIETY	Seager Wheeler	Saskatoon	Canora	Melfort	Netherhill	Scott	2003 Overall Combined
AC MURPHY	8334	5219	12693	9029	4624	5426	7554
FOOTHILL	8136	5009	11927	9068	5082	5341	7427
CALIBRE	8180	5043	10771	8330	4725	5263	7052
TRIPLE CROWN	8701	4276	10812	8562	4365	5327	7007
DERBY	7760	5051	11084	7878	4679	5428	6980
PINNACLE	8524	4436	9463	8407	5551	5238	6937
CDC ORRIN	8250	4642	9802	8131	5189	5346	6893
AC MUSTANG	8290	4665	10289	8028	4670	5002	6824
SPELT	7627	4929	10404	7881	4893	3749	6581
AC MORGAN	7547	4518	9724	7858	4449	5064	6527
AC ASSINIBOIA	7637	4086	9800	7913	4518	4803	6460
TEST MEAN *	8090	4714	10860	8302	4722	5105	6931
CV (%)	13	6	7	10	9	8	6.8
TEST LSD (0.05) *	1469	408	1159	1164	623	617	551

* Certain trials contained more varieties than shown in this table.

Table 14. 2003 SFC Annual Barley Forage Production Trial
Summary over six sites for varieties present at all sites

VARIETY	2003 DM Yields (kg/ha)						
	Seager Wheeler	Canora	Saskatoon	Melfort	Scott	Netherhill	2003 Overall Combined
AC RANGER	8230	13398	5193	8954	4354	4911	7507
AC ROSSER	8340	11961	5286	9066	4645	5033	7389
NEWDALE	8415	12224	5304	8555	4645	4910	7342
CDC SISLER	7689	12604	4951	8856	4478	5207	7298
CDC BOLD	8890	10774	5316	8969	4395	5433	7296
WESTFORD	8811	12852	4911	7760	4157	5095	7264
DILLON	7735	11401	4933	7816	4097	5518	6917
NISKA	8297	11479	4926	8453	3886	4337	6896
CDC BATTLEFORD	8069	9429	5078	8780	4181	5119	6776
AC HAWKEYE	8178	9747	4812	8737	4019	5147	6773
HAYBET	7720	10355	5098	7847	4411	4866	6716
ROBUST	6235	11093	4364	7193	3867	4513	6211
TEST MEAN *	7969	11559	5088	8497	4300	5047	7032
CV (%)	10	22	6	10	16	7	8.4
TEST LSD (0.05) *	1160	3575	422	1196	973	536	687

* Certain trials contained more varieties than shown in this table.

Table 15. 2004 SFC Annual Oat Forage Production Trial
Summary of four sites

	2004 DM Yields (kg/ha)				
VARIETY	Melfort	Swift Current	Scott	Saskatoon	Mean
PINNACLE	10894	6900	5976	12130	8975
CDC BALER	10767	7375	5826	11848	8954
CDC ORRIN	11040	6597	6200	11468	8826
TRIPLE CROWN	11291	6254	5741	11738	8756
FOOTHILL	9151	5746	5531	9990	7605
MEAN	10628	6574	5855	11435	8623
CV (%)	7.2	10.8	8.7	6.1	
LSD (0.05)	1191	1097	786	1090	

Table 16. 2004 SFC Annual Barley Forage Production Trial
Summary of four sites

	2004 DM Yields (kg/ha)				
VARIETY	Melfort	Swift Current	Scott	Saskatoon	Mean
NEWDALE	11489	8228	5644	13225	9647
FB006	11017	8242	6046	11855	9290
AC RANGER	11290	7684	5846	11650	9118
FB201	9840	8151	5793	12525	9077
SOMMERVILLE	10445	8483	5149	11373	8863
HAYS	10009	7851	5500	11365	8681
FB203	9634	7163	5734	10685	8304
HAYBET	9275	8399	5229	9450	8088
MEAN	10375	8025	5618	11516	8884
CV (%)	7.7	5.7	10.8	10.7	
LSD (0.05)	1184	681	897	1826	

Table 17. 2005 SFC Annual Oat Forage Production Trial

Summary of four sites

	2005 DM Yields (kg/ha)				
VARIETY	Melfort	Swift Current	Scott	Saskatoon	2005 Overall Combined
TRIPLE CROWN	9036	7604	10183	8754	8895
CDC ORRIN	8796	7814	9588	8461	8665
CDC BALER	9453	7350	9068	7700	8393
PINNACLE	8430	6806	8295	8111	7911
AC FURLONG	8293	7284	8335	7687	7900
FOOTHILL	8794	6803	7807	7066	7617
MEAN	8800	7277	8879	7963	8230
CV (%)	4.3	6.2	6.5	7.3	7.1
LSD (0.05)	564	678	866	725	412

Table 18. 2005 SFC Annual Barley Forage Production Trial
Summary of four sites

	2005 DM Yields (kg/ha)				
VARIETY	Melfort	Swift Current	Scott	Saskatoon	2005 Overall Combined
NEWDALE	8348	9483	10181	8711	9181
CDC COWBOY	8354	9433	9011	8129	8749
AC RANGER	8251	8054	9011	8384	8439
FB006	7935	8175	8390	8348	8212
CONLON	7337	7942	9412	7566	8084
HAYS	7163	8474	9348	7188	8043
HAYBET	7339	8172	8432	7683	7907
CDC YORKTON	7792	7961	7780	7473	7751
DRUMMOND	7035	7847	8323	7683	7736
SOMMERVILLE	7208	8233	7331	7809	7645
MEAN	7676	8377	8722	7897	8177
CV (%)	4.9	9.8	6.9	8.9	8.6
LSD (0.05)	546	1199	976	857	493

Table 19. 2003 - 2005 SFC Annual Oat Forage Production Trials
Varieties present at all sites in all years

	DM Yields (kg/ha)			
VARIETY	2003 (6 sites)	2004 (4 sites)	2005 (4 sites)	3 Year Average (14 sites)
TRIPLE CROWN	7007	8756	8894	8046
CDC ORRIN	6893	8826	8665	7952
PINNACLE	6937	8975	7911	7797
FOOTHILL	7427	7605	7618	7532
MEAN	7066	8540	8272	7832
CV (%)	7.6	5.1	5.5	8.1
LSD (0.05)	661	694	738	491

Table 20. 2003 - 2005 SFC Annual Barley Forage Production Trials
Varieties present at all sites in all years

	DM Yields (kg/ha)			
VARIETY	2003 (6 Sites)	2004 (4 Sites)	2005 (4 Sites)	3 Year Average (14 Sites)
NEWDALE	7342	9647	9181	8526
AC RANGER	7507	9118	8425	8229
HAYBET	6716	8088	7907	7448
MEAN	7188	8951	8504	8068
CV (%)	8.3	10.8	4.1	8.3
LSD (0.05)	770	1678	605	521

Appendix A. Temperature and precipitation data for the trial sites

		Apr	May	Jun	Jul	Aug	Sep	Oct
Kindersley (Netherhill)								
Mean Monthly Temperature (C)	2003	4.8	10.9	15.5	19.0	21.0	11.3	6.9
	30yr. Norm	**4.1**	**11.3**	**16.1**	**18.3**	**17.6**	**11.4**	**5.1**
Total Monthly Precipitation (mm)	2003	45.8	18.4	65.6	12.6	17.6	17.0	5.6
	30yr. Norm	**19.9**	**35.6**	**56.6**	**55.2**	**37.9**	**27.0**	**13.0**
Melfort								
Mean Monthly Temperature (C)	2005	5.4	9.1	13.9	17.1	14.5	8.6	4.4
	2004	2.7	6.9	12.8	16.5	13.4	10.5	3.0
	2003	3.7	12.6	15.3	18.0	20.0	10.4	5.4
	30yr. Norm	**2.2**	**10.6**	**15.5**	**17.6**	**16.3**	**10.4**	**3.9**
Total Monthly Precipitation (mm)	2005	12.8	36.8	165.4	70	99.4	96.6	27
	2004	11.8	85.2	66.0	56.4	54.8	52.0	15.1
	2003	27.5	45.0	52.0	35.8	24.4	23.2	0.0
	30yr. Norm	**20.7**	**41.4**	**61.9**	**66.6**	**53.1**	**41.4**	**26.6**
Saskatoon (Kernen)								
Mean Monthly Temperature (C)	2005	6.3	10.2	14.4	17.5	15.4	11.3	5.2
	2004	5.0	8.5	12.9	17.2	14.6	10.7	3.2
	2003	5.4	12.1	15.8	18.9	20.9	11.4	6.4
	30yr. Norm	**3.9**	**11.5**	**16.2**	**18.6**	**17.4**	**11.2**	**4.8**
Total Monthly Precipitation (mm)	2005	16	27.5	160.5	53.5	53.5	78	19
	2004	4.2	31.6	76.6	71.0	75.5	19.5	34.5
	2003	48.0	9.5	18.9	46.0	29.2	26.0	10.0
	30yr. Norm	**19.7**	**44.2**	**63.4**	**58.0**	**36.8**	**32.1**	**16.9**
Swift Current (CDA)								
Mean Monthly Temperature (C)	2005	6.4	9.6	14.6	18.3	16.4	12.2	6.6
	2004	6.2	8.6	12.9	19.2	15.1	12	4.5
	30yr. Norm	**4.5**	**11.0**	**15.7**	**18.4**	**17.9**	**11.7**	**5.9**
Total Monthly Precipitation (mm)	2005	26	24.4	98.9	21.4	52.1	31.4	10.9
	2004	34.0	42.2	63.0	47.0	65.4	33.5	20.5
	30yr. Norm	**21.8**	**42.1**	**66.1**	**44.0**	**35.4**	**30.9**	**15.4**
Yorkton (Canora)								
Mean Monthly Temperature (C)	2003	4.3	11.9	16.2	19.0	20.3	11.0	5.7
	30yr. Norm	**2.7**	**10.6**	**15.8**	**18.2**	**16.9**	**10.8**	**4.6**
Total Monthly Precipitation (mm)	2003	52.0	41.8	27.4	46.0	31.4	33.2	22.6
	30yr. Norm	**22.3**	**49.2**	**71.9**	**66.3**	**55.6**	**47.7**	**24.5**

Scott

Mean Monthly Temperature (C)	2005	5.4	9.2	13.4	16.3	13.6	10.3	4.6
	2004							
	2003	4.1	10.4	14.4	17.8	20.0	10.4	7.1
	LT normal	**3.1**	**10.2**	**14.5**	**17.3**	**16.2**	**10.4**	**3.8**
Total Monthly Precipitation (mm)	2005	27.4	41.4	100	76.8	88.4	74.6	15.2
	2004	2.4	35	52	69.4	44.4	14.8	15.5
	2003	24.1	21.8	34	66	43.8	43.8	13.3
	LT normal	**22.3**	**35.5**	**60.5**	**61.2**	**45.4**	**30.9**	**16.3**